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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/217,389	12/21/1998	ONDREJ SUCH	777.154US1	8400

26389 7590 08/12/2003

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EXAMINER	
ZHEN, LI B	
ART UNIT	**PAPER NUMBER**
2126	16

DATE MAILED: 08/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/217,389	SUCH, ONDREJ	
	Examiner	Art Unit	
	Li B. Zhen	2126	

-- Th MAILING DATE of this communication app ars on the cov r sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-20* is/are rejected.

7)☒ Claim(s) *5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Allowable Subject Matter

1. Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 – 4 and 6 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,237,043 to Brown in view of U.S. Patent No. 5,797,004 to Lindholm.

As to claims 1, 17 and 19, Brown teaches a system, computer and computer-readable medium (system, method, and computer-readable medium for providing a highly efficient locking mechanism for an object's shared data; column 3, lines 50 – 56) for providing a recyclable (the locking mechanism table entry allocated to the object may be updated to indicate that the table entry is now available for use by another object...this helps minimize the number of locking mechanisms required in the system, column 9, lines 40 – 45), at least one thread (multi-threaded program is a program which creates more than one thread of execution; column 5, lines 54 – 56), a pool of locks (Table 140 contains "n" locking mechanisms; column 7, line 65 – column 8, line

6), at least one object (object 100, Fig. 4; column 7, lines 1 – 16) that is capable of representing a resource (data area 104, Fig. 4; column 7, lines 1 – 16) needed by the at least one thread (thread which is executing requests synchronized access to an object's shared data, step 160, Fig. 6; column 8, lines 16 – 38), the at least one object having a variable (locking address 130, Fig. 4; column 7, lines 39 – 50), associating a lock from the pool of locks with the at least one object using the variable as a pointer (address of locking mechanism is stored in object's header, step 214, Fig. 7; column 9, lines 29 – 50), and returning the lock to the pool of locks when the at least one thread no longer needs to access the resource (the "H" bit may be checked...if it is equal to zero, the locking mechanism table entry allocated to the object may be updated to indicate that the table entry is now available for use by another object...this helps minimize the number of locking mechanisms required in the system, column 9, lines 40 – 45). Brown does not teach returning the lock to a pool of locks without having to destroy the at least one object.

However, Lindholm teaches (column 2, lines 7 – 39 and 60 – 65) a system comprising at least one thread (a group of threads), a pool of locks (cache of synchronization construct), at least one object that is capable of representing a resource (a set of objects that can each can only be synchronized with a predefined number of the threads at a time), a recyclable locking mechanism (object synchronization module) for associating a lock from the pool of locks with the at least one object (allocates the respective synchronization construct to the respective object), and returning the lock to the pool without having to destroy the at least one object when the at least one thread

no longer needs to access the resource (when a specific thread seeks de-synchronization with a specific object...de-allocates the specific synchronization construct and returns the specific synchronization construct to the free list).

It would have been obvious to one of ordinarily skilled in the art at the time of the invention to apply the teaching of returning the lock to the pool without having to destroy the at least one object as taught by Lindholm to the invention of Brown because this would allow other objects to reuse the lock, which would decrease the number of locks that needs to be created, and as a result reduce memory usage (column 2, lines 1 – 5 and column 4, lines 52 – 56 of Lindholm).

As to claim 11, this is a method claim that corresponds to system claim 1 with the addition increasing a variable of the object, a set of high bits for representing a pointer to a lock, a set of low bits for representing a lock status, and determining whether the variable is greater than a boundary values so as to allocate the lock. Brown teaches (column 7, lines 24 – 28 and 39 – 50; column 9, lines 20 – 30) increasing a variable of the object (TakeLock is incremented), a set of high bits (locking address 130, Fig. 4) for representing a pointer to a lock (pointer or index), a set of low bits for representing a lock status ("H" bit 128, and "A" bit 114, Fig. 4), and determining whether the variable is greater than a boundary values so as to allocate the lock (If the "H" bit is equal to one).

As to claim 2, Brown teaches (column 10, lines 10 – 15) deassociate the lock from the object (object shared data be unlocked) upon a second request by thread (thread requests).

As to claim 3, Brown teaches (column 7, lines 39 – 50) an associated variable that comprises an integer (locking address 130, Fig. 4).

As to claims 4, 18 and 20, Brown teaches (column 7, lines 13 – 28, 39 – 50, and 65 – 67; column 8, lines 1 – 6) a set of high bits (locking address 130, Fig. 4) defining the pointer (a pointer or index) to a lock and a set of low bits (TakeLock 122 and 'H' bit 128, Fig. 3) defining a status variable.

As to claims 6 and 12, Brown teaches (column 7, lines 24 – 28) that the set of low bits (TakeLock) equal to –1 when the lock is not taken. When the lock is first created, it would not have been assigned to any object yet and the initial value of the set of low bits would equal to –1.

As to claim 7, Brown teaches (column 7, lines 24 – 28) incrementing the set of low bits (TakeLock) upon first request (new thread requests lock on an object).

As to claim 8, Brown teaches (column 7, lines 24 – 28 and lines 40 – 45) an in-use status (TakeLock greater than or equal to 0) and the set of high bits (locking address) points to a lock.

As to claims 9, Brown teaches (column 9, lines 20 – 40) a spin-status ('H' bit is equal to one) such that the set of high bits is in the process of being set to a lock (determine and store next available locking mechanism in object's header, step 208 – 214, Fig. 7).

As to claim 10, Brown teaches (column 7, lines 24 – 28) decrementing the set of low bits (TakeLock) upon second request (thread unlocks an object).

As to claim 13, Brown teaches (column 9, lines 20 – 40) determining associated variable is less than boundary value ('H' bit is equal to one). The associated variable would not point to a lock if the condition described above were true. The method would obviously wait until condition is false ('H' bit is equal to zero) before using the variable as a pointer.

As to claim 14, Brown teaches (column 9, lines 20 – 40) determining associated variable is greater than boundary value ('H' bit is equal to 0, step 206, Fig. 7) and using the set of high bits as a pointer to a lock (step 226, Fig. 7).

As to claims 15 and 16, Brown as modified teaches (column 7, lines 63 – 67; column 8, lines 1 – 6 of Lindholm) recycling (de-allocate and return to free list) the lock (synchronization construct) when associated variable is less than threshold (waiters list and synchronizers list are both empty).

4. Claims 1, 17 and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,797,004 to Lindholm in view of U.S. Patent No. 6,374,286 to Gee.

As to claims 1, 17 and 19, Lindholm teaches (column 2, lines 7 – 39 and 60 – 65) a system comprising at least one thread (a group of threads), a pool of locks (cache of synchronization construct), at least one object that is capable of representing a resource needed by the at least one thread (a set of objects that can each can only be synchronized with a predefined number of the threads at a time), a recyclable locking mechanism (object synchronization module) for associating a lock from the pool of locks with the at least one object (allocates the respective synchronization construct to the respective object), and the lock returning to the pool without having to destroy the at

least one object when the at least one thread no longer needs to access the resource (when a specific thread seeks de-synchronization with a specific object...de-allocates the specific synchronization construct and returns the specific synchronization construct to the free list). Lindholm does not teach using the variable of the object as a pointer to associate an object with a lock.

However, Gee teaches using the variable of an object (instance objects) as a pointer (lock control block pointer) to associate an object with a lock (instance objects as well as class objects have a "lock control block pointer," LCB_Ptr, entry; column 18, lines 55 – 62).

It would have been obvious to one of ordinarily skilled in the art at the time of the invention to apply the teaching of using the variable of an object as a pointer to associate an object with a lock at taught by Gee to the invention of Lindholm because the lock control block pointer locates a lock control block which identifies the state of a lock on that object and controls access to the object (column 17, lines 10 – 16; column 18, lines 55 – 62 of Gee).

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li B. Zhen whose telephone number is (703) 305-3406. The examiner can normally be reached on Mon - Fri, 8am - 4:30pm.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Li B. Zhen
Examiner
Art Unit 2126

lbz
August 6, 2003

JOHN FOLLANSBEE
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